

## HARNESSING THE YUKON'S RIVERS

To Provide Cheap Electric Power

## FOR SMELTERS IN BRITISH COLUMBIA

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THE waters of the lakes and tumbling rivers of the vast wilderness that constitutes most of northern British Columbia are a magnet which is drawing industry to a new source of cheap power. These valleys and mountain ridges conceal many precious minerals but for the moment it is hydro-electric energy that is bringing investments of hundreds of millions of dollars into Canada's westernmost province; the provision of ample finance is enabling adventurous business interests to overcome obstacles which, a few years ago, seemed insuperable. The flow of rivers has been reversed, mountain torrents have been made to go where man decrees, lake levels have been changed and new lakes built. Industries which depend on cheap hydro-electric power find it worth while spending great sums in altering topography to suit their needs.

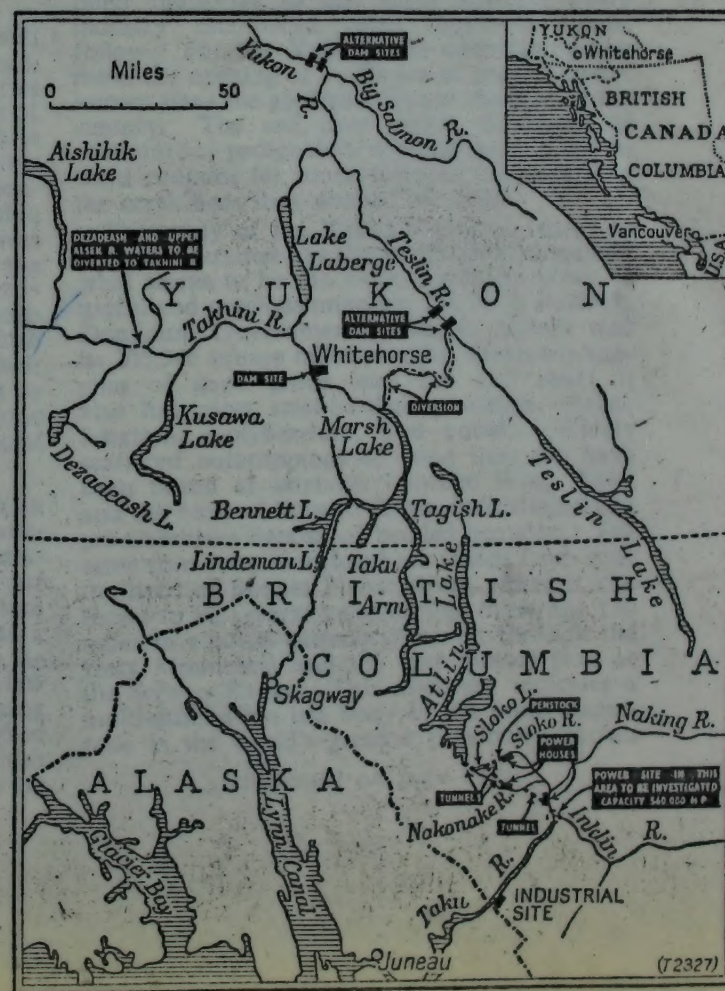
From Our Correspondent in Vancouver

British Columbia's industrial expansion, which was accelerated during the war, has continued to grow steadily and successfully through the post-war years. The project of the Aluminum Company of Canada in the Kitimat-Kemano area four years ago was the biggest industrial development undertaken in the province; now the firms of Quebec Metallurgical Industries and Frobisher are planning a new and perhaps even more impressive engineering feat which calls for an expenditure of \$1,000m. on the development of hydro-electricity and the establishment of metal processing plants.

Power will be obtained from a watershed in the Yukon that holds a potential 5m. h.p.; it will be transmitted southward to smelters and refineries in British Columbia which will treat ores and concentrates received from distant parts of the world as well as those obtained in the Pacific coast area. The watershed that will be tapped extends 200 miles from the south end of Atlin Lake in B.C. to the mouth of the Big Salmon River in the Yukon, and 300 miles east and west from Rancheria to Burwash. (The water storage in this area is second only to that of the Great Lakes.) Water will be impounded at an elevation of 2,200ft. and the fall through tunnels southward to the Taku River will generate at least 4,300,000 h.p., twice as much energy as will be derived from the St. Lawrence Seaway power project. The 2,000-mile-long Yukon River, which flows across Alaska and into the Behring Sea, will, with other streams and rivers, be diverted by a system of dams and mountain tunnels to flow into the valleys south of Atlin Lake. Power plants will be built in the Sloko, Nakonake and Taku River valleys. Later the waters of Alsek

Africa; (4) treatment of zinc concentrates as well as other base metal concentrates available in the Pacific area of Canada.

Emphasis at the start will be on the production of nickel, cobalt, iron, steel and manganese alloys. Then as blocks of power become available the range of ores to be treated will be extended. Other metallurgical and chemical projects are in the formative stage and when they reach the point of definite commitment power development can be speeded up to provide for them. By 1957 the estimated annual output will be: cobalt 1,520,000lb., nickel 1,980,000lb., iron and steel 122,500 tons, and manganese alloys 32,000 tons. By 1962 the figures are expected to be: cobalt 3,720,000lb., nickel 80,480,000lb., iron and steel 210,000 tons, and manganese alloys 160,000 tons. Among the first stages of the development, however, will be the construction of two pilot steel plants in Vancouver which, by 1956, will be producing 1,020,000lb. of cobalt, 480,000lb. of nickel, and 35,000 tons of steel. British Columbia has all the essential requirements of a profitable iron and steel industry; an abundance of iron ore is available at Zeballos on

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The power line that holds a potential 5m. h.p.; it will be transmitted southward to smelters and refineries in British Columbia which will treat ores and concentrates received from distant parts of the world as well as those obtained in the Pacific coast area. The watershed that will be tapped extends 200 miles from the south end of Atlin Lake in B.C. to the mouth of the Big Salmon River in the Yukon, and 300 miles east and west from Rancheria to Burwash. (The water storage in this area is second only to that of the Great Lakes.) Water will be impounded at an elevation of 2,200ft. and the fall through tunnels southward to the Taku River will generate at least 4,300,000 h.p., twice as much energy as will be derived from the St. Lawrence Seaway power project. The 2,000-mile-long Yukon River, which flows across Alaska and into the Behring Sea, will, with other streams and rivers, be diverted by a system of dams and mountain tunnels to flow into the valleys south of Atlin Lake. Power plants will be built in the Sloko, Nakonake and Taku River valleys. Later the waters of Alsek River will be turned into the Yukon.

### Three Main Dams

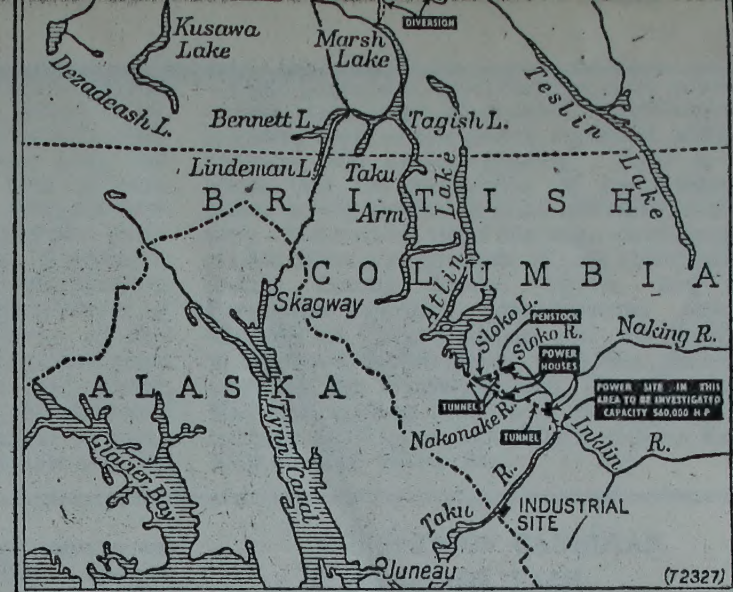
Three main dams will form large reservoirs, one 4 miles upstream from Whitehorse, another on the Teslin river, 40 miles north of Teslin Lake, and the third just below the confluence of the Yukon and Big Salmon rivers. Two tunnels through the mountains will carry water from Atlin Lake (elevation 2,192ft.) to the Nakonake river (elevation 1,100ft.), a drop of 1,092ft. for a maximum output of 2,800,000 h.p. Later a third tunnel will be built from the Nakonake Valley to the Taku river valley to generate 1,500,000 h.p. The first stage of the development envisages 880,000 h.p. for industrial use by 1962 at a cost of \$213m., plus another \$60m. for smelters and refineries. Frobisher has posted a \$2,500,000 performance bond.

The most suitable site for production plants is on the left bank of the Taku river in British Columbia, just east of the Canadian-Alaskan border. Power transmission lines will stretch 45 miles. Foreign shipments of ores and concentrates could be carried by barge 20 miles up the Taku river. The major metallurgical objectives fall into four general operations: (1) Treatment of nickel-cobalt ores and concentrates from New Caledonia, the Philippines and other Pacific islands for the production of these two metals; (2) smelting of Pacific Coast iron ores and concentrates for the production of pig iron and steel; (3) production of ferromanganese and silicomanganese from the ores of South-West

Alaska. The power line development can be speeded up to provide for them. By 1957 the estimated annual output will be: cobalt 1,520,000lb., nickel 1,980,000lb., iron and steel 122,500 tons, and manganese alloys 32,000 tons. By 1962 the figures are expected to be: cobalt 3,720,000lb., nickel 80,480,000lb., iron and steel 210,000 tons, and manganese alloys 160,000 tons. Among the first stages of the development, however, will be the construction of two pilot steel plants in Vancouver which, by 1956, will be producing 1,020,000lb. of cobalt, 480,000lb. of nickel, and 35,000 tons of steel. British Columbia has all the essential requirements of a profitable iron and steel industry; an abundance of iron ore is available at Zeballos, on Vancouver Island, on Texada Island, and at Campbell river, also on Vancouver Island. Campbell river is at present supplying Japan with ore.

The construction work on the new project will be undertaken by Northwest Power Industries, a subsidiary of Quebec Metallurgical Industries and Frobisher which, in turn, are subsidiaries of Ventures. Also associated with the project is Reynolds Metals of New York. Negotiations were carried on with both the federal Government at Ottawa and the British Columbia Government. Ottawa's assent to the project was necessary because of the use of water from the Yukon, which is a federally administered Territory. Both Governments laid down an important principle: that industries seeking British Columbia's water resources must establish their plants in the province and that rental should be paid for use of the water. That decision alone will result in an annual revenue to the provincial Government of nearly \$1m.

The first effects of the scheme will be felt in Vancouver's metropolitan area where construction, transport, and supply firms expect lucrative orders for several years to come. Four thousand men will be employed on construction in the north for eight years and, as at Kitimat, a city will arise at Taku (if it actually becomes the smelter site) with a population of 20,000 in a few years and the establishment of merchandizing and other services. There will be a marked increase in mining and companies in British Columbia with substantial mineral holdings are



expected to increase their activity when custom smelting at tidewater becomes available. Cheap hydro-electric power will attract by-product and other industries to the north and for every industry established other businesses must follow. For the Yukon, this undertaking can mean the opening of a new era of prosperity not known since the goldrush days at the turn of the century. The soil over which thousands of adventurous prospectors trudged wearily northward contains far more valuable minerals than the creek beds they washed for gold.

The study of the Yukon's mineral resources is continuous and has shown the area to contain what seems to be the world's greatest array of useful and precious minerals. Dr. H. S. Bostock, Dominion Government geologist, reports that its 205,346 square miles contains enormous supplies of good grade iron ore and coal; it also has most steel-hardening metals—nickel, tungsten, molybdenum, and cobalt. Widely scattered outcroppings of good iron ore have been found at intervals between Wind River and the head of Stewart River, indicating a late pre-Cambrian deposit of bedded hematite. The same iron formation has been traced from near the head of Bonnet Plume River, where it was found to be several hundred feet thick, for 130 miles in a south-easterly direction through the Hess Mountains and the easternmost part of the Selwyn Range. This discovery indicates a multi-million-ton ore body of the same magnitude as the world's greatest previously known

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sea level and its estimated volume is sufficient to cover the whole of England with 100 feet of water. The catchment area of the lake and river comprises virtually the whole of the colony—some 40,000 square miles.

It is only in recent years that an explanation has been found for the curious variations in the level of the lake. From the early 1930s, when observation seriously commenced, until the end of the last war, the average level of the lake started rising mysteriously but with regularity—an increase within a decade of over 20ft. In 1945 it started dropping, and in the past few years has fluctuated unpredictably. Research has shown that silt brought down by tributaries close to the southern end of the lake has formed

it is planned to build a series of hydro-electric stations. Until a major scheme is economically feasible a pilot programme would be embarked upon at a cost estimated at between £5m. and £10m. Electric power would help to save valuable timber, for many forest areas are now being stripped for fuel, and it would also make possible the development of what is probably Nyasaland's most prized potential—the immense bauxite deposits in the south-eastern corner of the territory. Although vast areas of this mineral have been proved, mining is hampered by lack of transport facilities and power. Undoubtedly the Portuguese in Moçambique would also be interested in the supply of cheap electricity and it is interesting to note that the

Light industry in Nyasaland is in its infancy—there are a dozen or so small establishments, including soap, confectionery, furniture, milling, plywood, and tobacco-grading. There is no doubt that the availability of hydro-electric power would accelerate local industrial expansion. Meanwhile, the Federation development plan involves a programme of road construction linking Zomba, Limbe, Mlanje, and the Portuguese border; improvements costing £127,000 at Chilika airport and the building of another £150,000 airport at Salima; development of the Nyasaland and Trans-Zambia Railways costing £1m.; and establishment of harbour facilities on Lake Nyasa at Kota Kota, Kaporo, and Nkata Bay.

## AUSTRALIAN SURVEY

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on a limited scale as the chief use of rutile was then in the manufacture of coated electric welding rods. In New South Wales and Queensland 12 plants are now processing black sand and in the year ended June 30 last they exported 39,000 tons of rutile, about half of it to the United States.

The largest deposits on the north coast of New South Wales are found chiefly in windblown dunes up to 50ft. in depth. To work these pontoon dredges, similar to those used in tin mining, are employed. The United States has offered to take 120,000 tons of titanium a year from Australia. Half a million tons of rutile would be needed to provide this output. The current price of rutile is about £A45 a ton.

The Shell Company of Australia, the Western Mining Corporation, North Broken Hill, and Broken Hill South have agreed to undertake joint exploration for oil in Australia. Shell holding a 75 per cent. share in the venture, Western Mining 10 per cent., and the two Broken Hill companies 7½ per cent. each. No titles for exploration are held at present but discussions have taken place with the Western Australian Government, with a view to obtaining titles in that state. If these are obtained, funds for geological examination will be provided by the companies and should it be decided to begin drilling a company would be formed to take over the rights of the Western Mining Corporation and the Broken Hill companies and provide their proportions of the funds necessary for further development.

In recent years the Shell Company has spent about £A1,500,000 seeking oil in Queensland

and New Guinea. Its most recent venture was a deep-drilling programme near Roma, Queensland, between 1947 and 1951. Work ceased when the deep test well struck igneous rock which precluded the accumulation of oil. Most of the promising areas in Western Australia are already held, mainly by West Australian Petroleum, but these prospecting licences expire shortly and may be redistributed. Assets of the three mining companies interested in the proposed new venture are almost £A30m.

## Harnessing the Yukon's Rivers

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deposits of rich iron ore in Ungava-Labrador, in Swedish Lapland, and in Minas Geraes, Brazil. Vast deposits of coal lie in these regions and, according to Dr. Bostock, other discoveries include platinum (which has been found in great quantities in association with nickel), copper, cobalt and zinc (at the bottom of a deep canyon in Canada's St. Elias Range). They also include palladium and silver, mercury, tin, bismuth and barium, as well as monazite, an atomic ore containing thorium (a fissionable metal which the United Kingdom and the United States obtain from Brazil and South Africa), asbestos, fluor-spar, Iceland spar and chalcophyrite. In addition there are petroleum and natural gas, vast stands of virgin timber and millions of acres of cultivable land.

It has often been said that the flow of wealth into the wild northland—a veritable treasure chest of mineral riches—will start when these deposits are used to supply a steel industry. The Frobisher undertaking seems to be the first step in that direction.

## RESULTS OF CANADIAN TRADE FAIR

This year the Canadian International Trade Fair in Toronto attracted over 25,000 businessmen. Among the 1,431 exhibitors 505 were Canadian; 192 firms from the United Kingdom were there as well as 117 from the United States. In order of space taken the leading countries were Canada, followed by the United Kingdom, the United States, Germany, Italy, Sweden, Belgium, Austria, India, France, the Netherlands, Japan, and Ireland. Nearly 23,000 of the business visitors were Canadians, with another 1,839 visitors coming from the United States.

The St. Lawrence Seaway project was on view in miniature for engineering firms interested in supplying equipment and for freight-conscious shippers to ponder on. The aircraft section was an innovation at the fair this year. A Canadian agent for English bicycles said that in three days at the fair he "made contacts that would otherwise have taken six months," deciding him on a return appearance in 1955. A manufacturer of a new type of copying lathe was unable to cope with all the foreign orders taken at the fair. A Toronto exhibitor of micrometer gauges, making an average of 30 excellent contacts a day, sold \$4,000 worth the first day, while a Canadian agent for Belgian punch presses reported, among other transactions, the sale of two presses to a British exhibitor, and a harvest of 80 other serious prospects. A further example of this type of international trading was that of a French machine tool maker who reported selling an \$85,000 machine to an American buyer.



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